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## Instructions for the Preparation of Technical Reports and Term Papers

by

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### Abstract

The following instructions are to be followed in the preparation of all term papers and research reports, and thesis work unless specific instructions to the contrary are given. The style used should be similar to that of technical papers in the Journal of the ACM or the IEEE Computer Transactions. Be brief and concise. Be sure to state your objectives clearly, describe what you did, why you did it and what result you achieved.

If you are writing a term paper that discusses one or more articles on a certain topic, be sure to identify the topic, why it is important, what the authors' objectives were, and how well they succeeded.

If you are writing a thesis keep in mind the basic purpose of the thesis. The purpose of the thesis is to show an ability to formulate a problem, do the research to solve it, and communicate the results. The thesis should cite relevant work and place its contribution relative to the other work. The thesis is narrowly focused on problem statement, motivation, approach, related work, and results. A write up and oral presentation of the work is required. This outcome enables an audience to comment on the work and demonstrates the students' ability to communicate.

### Contents

# 1. Report Format

## 1.1. Typing

Use a word processor and double-space. Use one side of a sheet only. Use white paper. You should leave 1-1/2 inch left margins. In addition you should leave 1 inch top, right and bottom margins.

The margins used for *these instructions*, are an example of correct margins.

## 1.2. Page Numbering

Number pages consecutively, use Arabic numerals for pages starting with the introduction. Use Roman numerals for the pages that precede the introduction (dedication, table of contents, abstract). The page after the title page is the abstract. The abstract page is Roman number ii. The title page is not numbered. Place the page number in the center bottom margin, as shown in *these instructions*.

## 1.3. Binder

Use a binder that does not damage your paper (no staples, holes punched, etc.). This will enable your report to be copied more easily. Type title and your name so that it can be seen on the front cover.

## 1.4. Headings

If possible, limit levels of headings to two. Three levels is the maximum. Major headings-use Arabic numerals; left-justify heading on page and bold-face; e.g., See *these instructions*.

## 1.5. Length

Term papers should never exceed 25 pages.

## 1.6. Equations

Pick a word processor that formats equations according to the style set by the AMS. Center and number your equations. Equation numbers should be right-justified. For example:

$$W = 3\beta + \frac{2\beta}{m} + \frac{\lambda X^2}{2(1-\gamma-\lambda)(1-\gamma)} \quad (4.63)$$

is the 63rd equation in section 4. By using a numbering sequence like this, a global search and replace will allow you to change chapter or section numbers without renumbering all your equations.

## 1.7. Section titles

Avoid punctuation after titles. For example:

avoid: 4.1 Algorithm Building...

use: 4.1 Algorithm Building

## 2. Procedure

### 2.1. General

The following steps, taken in order, should result in an acceptable paper.

The penultimate part of each step should involve a presentation to your colleagues, for a review of content and mechanics. Contact the writing department for help with mechanics, if you need it.

The last part of each step should involve a submission to your advisor. The submission of unproof-read material to your advisor is unwise. It is safe to proceed to a next step after positive feedback is obtained from the advisor.

### 2.2. Begin Immediately

An incomplete project, with a good write-up, can obtain a good grade. A completed project, with no write-up will earn a grade of F. Do **not** wait for your research results to begin your writing.

With the exception of your conclusion, much of your paper may be written before research is complete.

### 2.3. Proposal

Start your paper with a single-page, double-spaced proposal. Do this as soon as possible. An unacceptable proposal will always result in an unacceptable paper.

### 2.4. Outline

Create an outline for your paper. Use section 3 as your guide. Experienced writers use outlines. Inexperienced writers **need** outlines.

### 2.5. Flesh out the Outline

Add a paragraph or two to each section of the outline. This is the first step toward creating a working draft.

You may proceed in a depth- or breadth-first manner when fleshing out an outline.

### 2.6. Rewrite and Get Help

Writing well is hard. Good papers result from many revisions. You should work in parallel with your reviewers, revising your paper as a function of research results and reviewer comments.

Revise constantly. Never try to write your way out of a complex sentence, just start over.

Have someone read your work over. An objective eye is very important for this.

Contact the writing department for help

## **3. Arrangement of Contents and Formulating an Outline**

An outline is a very useful tool for organizing your work. Main sections in your outline may be indented, but your report should not have indentations like the outline.

An outline should mirror the entries of this section.

### **3.1. Title Page**

Center and double space all text on the title page. Two inches from the top margin place the course number and course name. Then place the report title. Place the author's name after the report title. List any degrees you already have received, the place and the date.

At the bottom, place the lines indicating your department and school. For example: see the title page of *these instructions*.

Leave a 2 inch bottom, right and left margin on the title page.

### **3.2. Abstract**

The abstract appears on page ii of every report or term paper.

The abstract should contain simple statements about the report content.

Give a brief (200 words or less) synopsis of the contents of the report. Be as concise as possible. You can use your conclusion to help you write your abstract. The abstract is started first and finished last.

Sentence one: the purpose State the purpose of the paper. Start with an action: We present a study that reviews various methods for design. What did you want to explore?

Sentence two: the argument State the main arguments and methods. How did you show, discuss, and demonstrate?

Sentence three: the conclusions What did you find? What does this mean?

### **3.3. Acknowledgment (if required)**

If funds were provided which permitted you to carry out your work, mention the name of the source, e.g., name of fellowship or name of contract agency and contract number. For example:

"The research work described in this report was sponsored by the Air Force Office of Scientific Research, Directorate of Information Sciences, under Grant AF-AFOSR-24-66."

Also, if you received a significant amount of help from someone, you may mention that person's name here.

### **3.4. Table of Contents**

Use a separate sheet with right-justified page numbers. Use dotted leader tab. For example: see *these instructions*.

### **3.5. Introduction**

Lead the reader into the subject. State your objectives, describe the problem, review previous work by you and by others. For a term paper that reviews one or more articles on a certain topic, identify the topic, state its significance to your sphere of interest, and indicate the author's objectives.

In engineering the introduction may contain subsections of Problem Statement, Approach and Motivation. For example:

#### 1.1 Problem Statement

In engineering, a problem is usually in the form of:

Given (some condition)

Subject to (some constraints)

Find (a solution).

A well-posed problem is a necessary, but not sufficient condition, for the finding of a solution.

#### 1.2 Approach

This section should describe your approach to solving the problem.

Kind of program or hardware design used. What were the implications of choosing particular methods of data gathering and analysis? Did certain techniques cast some doubts or further veracity on your findings? What did the literature say and how does it matter to your research? How did your methodology affect the findings?

What is the originality of this approach? Describe the rigor of research methodology.

### 1.3 Motivation

This section should describe why someone should be interested in solving the problem. State the significance of the problem. What is contribution to the appropriate body of knowledge? What wider principles emerged from your research? How can people in your field use it? Can people in other fields use it?

State the impact of a problem solution upon society (if there is one). How can other researchers take your work forward? How can your research be applied in practice? Who is able to apply your findings? What might they do? When and where might it be done?

What are the implications of other potential answers to the problem?

## 3.6. Body of Report

Break into major sections, each with its own heading, as required for good organization of the subject matter. For a research report, describe the actual work you have done. Use whatever degree of detail is required.

Give important derivations, describe significant experiments, etc. Note that some derivations, proofs, or experimental data are best put into an appendix to prevent cluttering of the report.

For a term paper of the literature-review type, describe what the author(s) did, the new ideas or results they present, and the impact of this on your sphere of interest.

For example:

### 2. Body (whose title should not be Body)

For a hardware or software project you should consider an organization that describes each of the major components.

If the project works, focus on what works. Leave what did not work for the "problems encountered" section of the conclusion.

Answer the questions: **What, Why, Where** and **How**.

For example, in a software project, describe the details of the software implementation

## 1. Main program

You may use pseudo code, flow charts, and high level descriptions of the basic algorithm. You should state the following:

**What** (your code is going to do),

**Why** (why your code needs to do this, relative to the spec.),

**Where** (this code fits in with other subprograms)

**How** (does this code work).

These parts are **not** all equal in size. Also the parts do not have to be clearly labeled (although a consistent organization will help your reader).

You may divide your paper by program entity, relation or attribute (i.e., subroutine, flavor, class, data structure, procedure or function), for example:

## 2. Subroutine A

## 3. Subroutine B

Hardware projects may be organized by part, purpose and usage, for example:

## 1. The CPU

## 2. The Serial Interface

**What** (is the serial interface) The serial interface consists of an ACIA

(Asynchronous Interface Adapter), known as the Motorola 6850.

**Why** (do you need this). It provides a communication path between the Mikbug systems and another computer via an RS-232 interface.

**Where** (does it go) The ACIA bug is wired to the data bus of the CPU. It has chip selects which enable the bug. As seen in figure 2.1, the ACIA is wired using discrete logic decoders to the address bus of the CPU... The decoders are (blah blah blah) and connect the 6802 with the 6850's chip select.....

**How** (does it work) To transmit using the 6850, parallel data is presented to the input pins number (in1..in8) and latched using the chip select. The baud-rate generator then clocks out the bits on the serial output line. Some other chips are needed to ....

## 3.7. Conclusion

This is an important section. Review what you have done and what your results have been. In particular, restate what you consider the significant implications of this work to be.

A conclusion summarizes your results and has the subsections: Problems Encountered, and Future Work.

The problems encountered section is the place in which you describe any difficulties you may have had during the course of your work. Failed experiments may be summarized here.

In the problems encountered section you may make statements, which are true, in *your* opinion. Make it clear that this is *your* opinion, and not a part of some experimental result. Your feel for a problem is important and can not always be proved. This is the place to say what you would have done differently.

For example: The printed circuit card presented in this report was the result of 5 attempts. The first 4 attempts failed, in my opinion, because we lacked the proper layout program. In the future I would try to get the correct tools before attempting layout.

The future work section is the place to state the substantial problems in this area to solve in the future.

### **3.8. Literature Cited**

List only references that you have cited. Use et al. to abbreviate author lists, when appropriate.

A complete citation includes the publisher's location (including city and State, and if not in country of the publication, the country).

You need to use a journal or book as a source for journal style articles. *PC magazine*, for example, is not a good source .

Examples:

[Aho et al.1985] Aho, A., Hopcroft, J. and Ullman, J., 1985. *Data Structures and Algorithms*, Addison-Wesley Publishing Company, Reading, MA.

[Fowler 1965] Fowler, H.W., *Modern English Usage*, Oxford University Press, NY. 1965.

[Hodges and Whitten] Hodges, J. and Whitten, M. 1977. *Harbrace College Handbook*, Harcourt Brace Jovanovich, Inc., NY, NY.

[Leunen 1992] Leunen, Mary-Claire van. 1992. *A Handbook for Scholars*, revised ed., Oxford University Press, New York.

[Strunk and White] Strunk, Jr., W. and White, E.B., 1972. *The Elements of Style*, Macmillan Publishing Co., Inc., NY, NY.



## 3.9. Appendices

Use appendices as required. Often the appendices can be used for lengthy proofs, code listings, example runs, data tables and other supporting material not necessary to the exposition of your results.

Appendices are not counted in the total length of your paper, so if you are finding that your paper exceeds the 25 page limit, you may consider placing some of the paper's supporting material in the appendices.

## 3.10. Tables and illustrations

Tables and illustrations should be labeled with the section number as a prefix. For example:

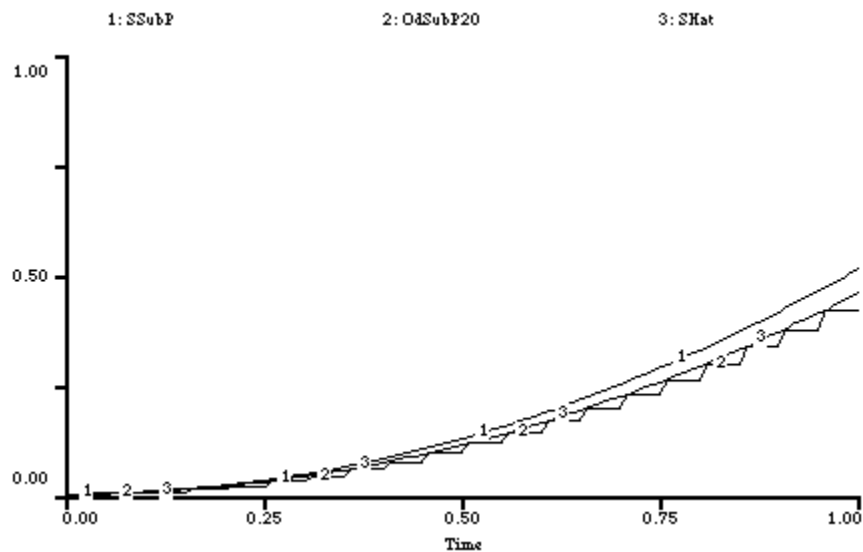


Figure 5.3.3-4. The Observer's Estimate of Path length.

The plant's front-wheel path length is sampled with 10% error at 20 hertz by the odometer. In between sensor samples the observer uses the plant model to compute an estimate of the plant's front-wheel path length.

Figure 5.3.3-4 is the fourth figure in section 5.3.3. If you cannot include figures in the text, you may include them in the appendix.

Do not use page references to refer to figures in your paper.

For example:

avoid: Figure 2.3-1 on page 3 shows...

use: Figure 2.3-1 shows...

### **3.11. Vita**

Include a brief biographical statement (about 1/3 page). List schools you attended, positions held in university or industry, current field of professional interest, current academic state (e.g., working toward an M.S. degree), special honors or fellowships awarded, and membership in professional and scientific societies.

## **4. Some Content and Grammar Rules**

### **4.1. Avoid Sweeping Claims**

Avoid making sweeping claims that are unjustified.

For example:

avoid: A very important feature of the Walsh function...

use: A feature of the Walsh function....

### **4.2. Omit Needless Words**

OMIT NEEDLESS WORDS OMIT NEEDLESS WORDS OMIT NEEDLESS WORDS OMIT NEEDLESS WORDS [Strunk and White].

### **4.3. Avoid Past Tense**

avoid: A common clock signal drove the three counters...

use: A common clock signal drives the three counters..

"Probable-Possible, my black hen,

She lays eggs in the Relative When.

She doesn't lay eggs in the Positive Now

Because she's unable to postulate how."

-- Frederick Winsor

### **4.4. Use Simple Sentences**

avoid: A switch operated on the "clear" inputs of the counters so that the counting sequence could be initialized at will.

use: A switch is used to clear the counters.

## **4.5. The Use of I**

Use "I" in a report, if you are actively involved in an experiment, i.e., "I found that the LM105 regulator could output 50% more current when run under water. The problem is that the LM105 explodes after a short while."

Usually you avoid the use of the pronoun, "I". For example:  
avoid: "I will provide five different ways to build a 10 KV supply" ...

use: "This paper shows five different ways to build a 10 KV supply" ....

## **4.6. Avoid repeating words in a sentence.**

For example:  
avoid: "A design can not be designed over night"...

use: "A design can not be done over night"...

## **4.7. Avoid one paragraph sections**

Like the ones in this writing guide, but do use sections to organize your work.

## **4.8. Avoid Passive Voice**

avoid: my first computer will always be remembered by me.

use: I will always remember my first computer.

## **4.9. Make the Possessive Singular by adding `s**

avoid: the signals of the CPU...

use: the CPU's signals...

## **4.10. That is that but which is which?**

Use *which* for that which is a defining clause (restrictive pronoun) and use *that* for that which is a non defining clause (nonrestrictive pronoun) [Fowler 1965].

In plain, simple English, that means you should use *which* for parenthetic expressions and use *that* for non-parenthetic expressions [Strunk and White].

The exceptions are for the case when you need to describe a group or number of things (use "which").

For example: *Which* is better, FORTRAN or a program *that* produces code *that* is clean. A letter *that* he wrote. A stochastic Petri-table is a data structure *that* is shown to enable the computation of high-order real-time Markov processes. The program, *which* is slow, is the one *that* I want to use.

#### 4.11 Hyphens

From The Chicago Manual of Style: "A second helpful principle is this: When a temporary compound is used as an adjective before a noun, it is often hyphenated to avoid misleading the reader. The example:

"A fast sailing ship" is ambiguous. It is now sailing fast or a sailing ship that is capable of rapid navigations. A fast-sailing ship is different from a fast sailing ship. On the other hand, much loved friend is not in need of a hyphen as it is not ambiguous. On the other, other hand, much-loved friend does no harm, either.

To remove the hyphen, move the modifiers....

able-bodied seamen vs. a seamen who is able bodied

a less-appreciated art vs. an art less appreciated.

Real-time 3D range sensor vs. 3D range sensor that is real time.

far-field objects vs. objects that are far field.

## 5. Plagiarism

Plagiarism has been defined as the borrowing of ideas or words and pretending that they are yours [Higham 1993]. It is possible to copy a sentence or more from a source by quoting and citing the source, but only do this if you need to. In general it is considered better to paraphrase and then give proper citation.

"Quote what is memorable or questionable, strange or witty. Paraphrase the rest." [Leunen 1992]

Fairfield University has a policy on this matter Plagiarism can be deliberate or accidental. It can be partial or complete. No matter which, the penalties are often similar. Understanding what constitutes plagiarism is your first step to avoiding it.

Some acts of plagiarism:

- \* Copying and pasting from the Internet without attribution.
- \* Buying, stealing, or ghostwriting a paper.
- \* Using ideas or quotations from a source without citation.
- \* Paraphrasing an author too lightly.

The University has defined plagiarism as: "Plagiarism is the act of misrepresenting as one's own original work the ideas, interpretations, words or creative works of another. These include published and unpublished documents, designs, music, sounds, images, photographs, computer codes and ideas gained through working in a group. These ideas, interpretations, words or works may be found in print and/or electronic media."

## 6. Grading

The grading of reports is generally left up to a faculty members, and, as a student, it is your responsibility to establish the grading policy before creating written work.

Typically, all work will be graded for mechanics (typing, spelling, grammar, form, etc...) as well as content. In the past up to 15% of a written assignments grade may be attributed to mechanics.

Some professors will take off a point for a minor error in mechanics. After a while, a professor may find a report unreadable and simply try to obtain the basic idea. At this stage the report may be returned (uncorrected) to the student with instructions for a major rewrite. This is rare, however, and most students can write well enough to avoid this.

Plagiarism is a serious offense. For minor homework, I typically take off 15% on the first offense. For a major term paper, plagiarism is considered cheating and an F will be assigned with a letter written to the students file.

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